

Remarks

The Office Action dated June 22, 2005 has been carefully considered. Claims 1-8; 9-16; and 17-24 remain in the case with none of the claims being allowed (the Examiner had previously indicated at one time that Claims 17-24 were allowable over the prior art).

The Examiner has rejected Claims 1-24 under 35 U.S.C. §112, first paragraph as failing to comply with the enablement requirement. The Examiner argues that Applicant's specification would not enable one of ordinary skill to perform *adjusting the reducing environment time period such that SO₃ is reduced to SO₂ prior to selective catalytic reduction to achieve a desirable level of SO₃*, as recited in Claim 1; *adjusting the reducing environment time period such that SO₃ is reduced to SO₂ to achieve a desirable level of SO₃*, as recited in Claim 9; or *adjusting the reducing environment time period such that SO₃ is preferentially reduced to SO₂ to achieve a desirable level of SO₃*, as recited in Claim 17. Reconsideration and allowance is respectfully requested in view of the following remarks.

As the Examiner is aware, the question of enablement typically focus on 8 factors:

- (1) The breadth of the claims;
- (2) The nature of the invention;
- (3) The state of the prior art;
- (4) The level of one of ordinary skill;
- (5) The level of predictability in the art;
- (6) The amount of direction provided by the inventor;
- (7) The existence of working examples; and
- (8) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

In re Wands, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988). In addition, the Examiner cannot disregard evidence related to these factors. (see, for example, MPEP 2164.01(a)).

Regarding the breadth of the claims, the claimed invention is narrow. For example, Claim 1 is directed to a specific method for controlling SO₃ in a combustion process of a sulfur-containing fuel utilizing selective catalytic reduction for the control of NO_x emissions.

The claimed invention is not, in contrast, directed to all methods or devices for SO₃ control. This narrow scope supports enablement.

Regarding the state of the prior art, it is well developed. Technology related combustion furnaces and coal powered fire plants, and more particularly to reducing pollution associated with combustion furnaces and coal powered fire plants, is well developed. The historic nature of the combustion arts supports enablement.

Regarding the level of one of ordinary skill, it is high. Most people practicing in the present art have advanced engineering degrees (PhD or MS) in fields specific to the art. This high level of skill supports enablement.

Perhaps most important to the analysis, however, is the number and breadth of working examples (experiments actually performed) contained in the specification as filed. Working examples reduce, if not eliminate, the amount of experimentation needed to practice an invention. Table 1 and Table 2 provide the results of seven working examples of Applicant's invention. The results of these working examples were taken by third-party companies. These examples all strongly support enablement.

In particular, with regard to the Examiner's argument that there is no discussion of how rotated air is adjusted, Applicant submits that Tables 1 and 2 provide an enabling disclosure that would allow one of ordinary skill in the art, e.g., an engineer, to practice the present invention without undue experimentation. The various examples provide specific disclosure of how to adjust OFA, for example, shallow staging (adjusting to about 10% OFA), mid staging (adjusting to about 20% OFA), and deep staging (adjusting to about 30% OFA). The effect of adjusting on SO₃ and SO₂ is illustrated for each adjustment. The efficacy (percentage of SO₃ reduction) achieved through Applicant's invention is also shown in the Tables.

Regarding the quantity of experimentation needed to make or use the invention based on the content of the disclosure, it is low. As discussed above, those of ordinary skill in the art could perform certain embodiments of the present invention, e.g., OFA embodiments, with little to no experimentation based on Applicant's written description. As the Examiner is aware, "the key word is 'undue,' not 'experimentation'". *In re Wands*, 8 USPQ2d at 404 (Fed. Cir. 1988). "[A] considerable amount of experimentation is permissible if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed" *Id.*

Applicant's specification as filed contains considerable guidance how experimentation, some routine, should proceed. For example, based on the specification, the reducing environment time can be adjusting by (1) lengthening the distance between stages; (2) increasing the mixing for macro-staging applications; (3) decreasing the mixing for micro-staging applications; (4) reducing the mass flow between stages (deeper staging); (5) increasing the volumetric utilization between stages (e.g., swirl); (6) increasing pressure; and (7) increasing density. These methods are all well within the ability of one of ordinary skill in the art, and even if some experimentation is required, it will not be undue.

The Examiner also rejected Claims 1-8 under 35 U.S.C. §112, first paragraph, for failing to comply with the written description requirement. Specifically, the Examiner states that "prior to selective catalytic reduction" was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, has possession of the claimed invention. This rejection is respectfully traversed.

Initially Applicant would like to point out that Applicant's use of the selective catalytic reduction acronym "SCR", rather than the "selective catalytic reduction" terminology, may account for the Examiner's current rejection. Applicant submits that those of ordinary skill in the art would recognize SCR as selective catalytic reduction. Applicant has, however, currently amended the specification to introduce "selective catalytic reduction" prior to the SCR acronym.

Further, Applicant's specification is replete with discussion of selective catalytic reduction (SCR). Applicant's specification teaches problems associated with more traditional technologies using SCR (see, for example, sections in the Description of the Prior Art discussing SO₃ decrease, SO₃ increase, SO₃ control). For example, as discussed in Applicant's specification:

(1) The catalyst blends typically used in the **SCR** to reduce NO_x to N₂ (in the presence of ammonia) also oxidize SO₂ to SO₃.

(2) High sulfur U.S. coal generates anywhere from 2,000 to 3,000 ppm of SO₂ in the boiler, and therefore can result in 20 to 30 ppm of SO₃ out of the **SCR**.

(3) [A]s much as 50 percent, or 10 to 15 ppm, of the SO₃ coming out of the **SCR** will make it past the scrubber and out of the stack.

(4) At about 8 to 10 ppm, depending upon the particulate concentration, SO₃ becomes visible as a blue plume.

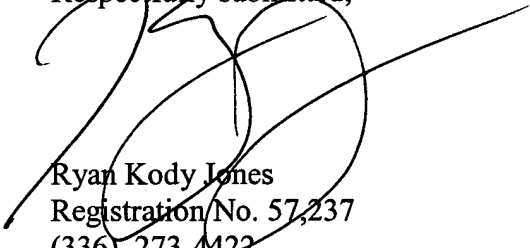
(5) [B]ecause any SO₃ formed **prior to the SCR** adds to the effluent SO₃, reducing the SO₃ formed **prior to the SCR** is important for reducing the effluent SO₃ and permits the use of **SCR** for the reduction of NO_x for gases without generating excessive amounts of SO₃.
(Description of the Prior Art, page 2 and 3; emphasis added).

Applicant respectfully submits that the above arguments overcome all 35 U.S.C. §112 rejections.

Additionally, Applicant respectfully requests that the Examiner withdraw the finality of the current Office Action and respond to Applicant's arguments regarding the 35 U.S.C. §102 and 35 U.S.C. §103 rejections of the previous Office Action. It is believed that the "final" rejection was sent in error.

Applicant submits that all claims are allowable for the reasons given above and that the case is in condition for allowance. Such action is respectfully requested. However, if any issue remains unresolved, a telephone interview to expedite allowance and issue would be welcomed.

Respectfully submitted,


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